January 29, 2019

Source Water Protection Strategy Update

Data Gathering and Analysis Workgroup Meeting Summary

1pm-4pm

The meeting began with brief introductions by the six participants which included NHDES staff, stakeholders, and partners.

Introduction

Pierce Rigrod began with an introduction to the Source Water Protection Strategy Update process; including a brief discussion of past strategy update efforts, organization of the strategy update process (i.e., advisory committee and working groups) and the roles the work groups will play in the strategy update process. Pierce then provided an outline of future data considerations to be discussed by the Data Gathering and Analysis workgroup, including protection and vulnerability metrics, and chloride in public water supply (PWS) wells as a result of road salt trends.

Cyanobacteria and Drinking Water Program - Introduction

Tyler Davidson then began with an introduction that outlined some of the data surrounding cyanobacteria in NH, and at surface water sources in particular. Tyler shared available data outlining the trends in cyanobacteria blooms across NH, and at PWS surface sources in NH. Beach advisories/lake warnings as a result of cyanobacteria blooms appear to be on the rise, particularly over the last three years. Seventeen advisories/lake warnings for cyanobacteria were issued in 2017, and 34 in 2018. Tyler noted that this could be a result of increasing frequency of blooms, increased public awareness related to blooms, or a combination of both. Tyler noted that both are noteworthy trends. Tyler then highlighted some of the trends observed during the 2017 Beach Inspection Program sampling season. The earliest and latest advisories were issued on May 31 and November 27, respectively. In addition, the average advisory lasted 16 days (with a range from 5 to 72 days). Tyler presented a tabulated list of NH surface water sources with confirmed cyanobacteria blooms. The list included eleven (11) surface sources in NH, including eight (8) with confirmed blooms within the past five (5) years. Lake Waukewan, Massabesic Lake, and Arlington Mill Pond were highlighted as having particularly long and/or recurring yearly blooms.

Cyanobacteria and Drinking Water Program – Data Considerations

Assessment

Tyler then prompted a discussion related to data considerations that can improve the Drinking Water and Cyanobacteria Program. An excerpt from the 2015 EPA publication, "Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water" was used to stimulate discussion related to the value of system-specific source water evaluations for vulnerability to cyanobacteria blooms. Would it be appropriate to put effort toward completing such assessments? Should they be completed by DES on a state-wide level? Should the systems be completing this work, with DES providing a guiding role? Dave Neils posited that if pursued, an evaluation that results in "tiers" of vulnerability would be the best approach. Marco Philippon explained that watersheds are very different, and what works for one system in terms of management may not work or be possible for another. Marco used some of the watershed management work done in Concord Water Department's watershed as an example. Pierce Rigrod noted that watershed management is often a difficult "ask" for water systems. Nancy Leland mentioned that her work has led her to develop a tiered approach to rapid assessment with her volunteers on Cape Cod. Nancy cautioned that input parameters for a vulnerability analysis would need to be chosen carefully, as her work has identified wide variation in values such as microcystin concentration, some that may not be applicable to this region and would invalidate models built on them. Sara Steiner noted that such a vulnerability assessment would be more useful for those water bodies that aren't yet experiencing blooms, but could be at risk. An assessment of their vulnerability may prompt them to undertake monitoring procedures. The result of this discussion is that a state-wide vulnerability analysis could be a good use of resources, though it would not need to be a high-priority effort. Such an analysis would educate water systems as to their vulnerability to cyanotoxins and allow them to select monitoring procedures appropriate for their system. If this were to be completed, input parameters should be carefully selected to reflect conditions known to support cyanobacteria blooms in this region.

Monitoring Procedures

Tyler then outlined the four systems that are known to currently be engaged in some form of monitoring (Keene Water Department, Rochester Water Department, Pennichuck Water Works, and Manchester Water Works) and compared and contrasted each. A discussion regarding cyanobacteria monitoring procedures and equipment ensued. Nancy Leland stated that the two primary components of the Cyanobacteria Monitoring Collaborative (CMC), cyanoScope and cyanoMonitoring, are still the best *current* options for water suppliers to

engage in monitoring. Engaging in cyanoScope allows water systems to obtain an understanding of the cyanobacterial community composition through sampling and identification of cyanobacteria to the genus level. Performing cyanoMonitoring offers water systems the ability to identify temporal trends in cyanobacteria populations in their waterbody. Together, the data collected from these programs allows for participation in cyanoCasting, Nancy's approach to predictive modeling for cyanobacteria. Nancy expounded upon the monitoring and predictive modeling work she has completed. Nancy believes that "blooms," or visible surface accumulations of cyanobacteria biomass, are not the sole determination of potential public health/environmental risk. Rather, Nancy stresses that any effective monitoring program begins with an understanding of the cyanobacterial community composition and the population dynamics within the water body. That is, water systems need to know "what is there," at a very minimum. This is where the value of cyanoScope reveals itself. Fluorometry is also still one of the best options for monitoring based on its ease of use, though the results should be interpreted on a site specific basis (i.e., not directly comparable from site to site). Nancy mentioned that there may also be a place for the fluorometric measurement of phycoerythrin (traditionally associated with marine cyanobacteria) in cyanobacteria monitoring. The premise behind this is that the ratio of phycoerythrin to the other cyanobacterial accessory pigment phycocyanin can be used to infer the community composition of a bloom and thus its potential for toxicity. This could make monitoring easier for water systems, though the research is still in its early stages. More will be known about the efficacy of this approach this summer. Pierce expressed a desire to develop a firm plan for the analysis of monitoring data received from water systems undertaking cyanobacteria monitoring.

Monitoring Tools

During the discussion of monitoring procedures, monitoring tools were also discussed. As understanding the cyanobacterial community was identified as a fundamental goal in any monitoring program, the group discussed the use of microscope for cyanobacteria identification. Nancy mentioned that the microscope offered with the cyanoScope kit is a good start and capable of performing the necessary functions for ID, most users who start with this microscope often opt for something a bit more robust. The group agreed that a quality microscope for this purpose could be purchased for anywhere from $500 - $1,000. Microscope and imaging software and equipment was also discussed, and AmScope and ModiCam were identified as leaders in this arena. Abraxis test strips were also mentioned as a potentially useful tool, when used in conjunction with other monitoring techniques. It was posited that a water system currently not engaging in monitoring, yet experiencing recurring blooms (such as

Meredith Water Dept.) would greatly benefit from an enhanced understanding of cyanobacterial population dynamics that would be able to assess exposure potential.

Pierce posed a question to the workgroup regarding the potential use of a water quality sonde to support cyanobacteria monitoring efforts. Nancy cautioned that water quality sondes provide continuous measurements of the quality of whole lake water and, as such, typically underestimate levels of phycocyanin. In addition, water quality sondes cannot determine the composition of the cyanobacterial community. Nancy states that a sampling program that focuses on extracted phycocyanin (through a single freeze-thaw cycle) would be a more appropriate approach. Nancy also stated that, based on her previous work, these samples could be collected from in-plant locations, such as the raw water clear well, to estimate the conditions near the intake and limit the resources needed to collect the sample. This would need to be tested on other systems to ensure the observed relationship holds.

Training

A discussion regarding the training offered to water system personnel regarding cyanobacteria was conducted. It was noted that training in microscope operation and cyanobacteria identification procedures would be highly effective in allowing water systems the ability to participate in cyanoScope monitoring, identified during this meeting as a critical component to any monitoring program. It was mentioned that an effective training program should be structured. Commitment from water suppliers to cyanobacteria monitoring is a large hurdle to overcome. It was discussed that an ideal situation would be to conduct "Train the Trainer" events that would allow individuals to then pass on the skills to others in their community/organization. This led into a discussion regarding a potential "Cyanobacteria Certificate" for public water system personnel. This was an idea generated by Jim Haney at UNH. The consensus among the group was that this would be a worthwhile effort to explore. Nancy suggested we contact Jim Haney for details and potential collaboration.

Response

Tyler presented to the workgroup the current DWGB CyanoHAB response protocol to stimulate a discussion of response procedures. Nancy stated that her screening protocol may be a different way to identify a bloom, rather than waiting for visual evidence of a bloom. We should strive to be ahead of the game rather than behind. Nancy expressed desire in testing her models with data from specific systems so that the model can be validated for specific water bodies. As the discussion pivoted to water treatment for cyanotoxins, Tyler displayed a

table outlining the surface sources in NH, their susceptibility to cyanobacteria (based on water body characteristics [i.e., river vs. lake or reservoir]), and their ability to effectively remove cyanobacteria cells based on their current treatment processes. Eight (8) water systems were identified as being susceptible to cyanobacteria without effective treatment to remove cyanobacteria cells, including Sunapee Water Works, Hillsborough Water Works, and Newport Water Works. It was stated that a priority should be to work with these systems to develop an adequate cyanobacteria emergency plan that includes treatment optimization. Marco stated that he learned quite a bit about cyanobacteria treatment from networking with other utilities that have had a cyanobacteria bloom. He mentioned that it might be worthwhile to facilitate a way for water systems to share previous data from plants experiencing blooms so that systems with similar treatment processes could look to in the event of a bloom reaching their treatment plant. This led to a discussion regarding what type of data we are collecting relative to cyanobacteria blooms and the treatment effectiveness of varying systems.

Nutrient Reduction

A brief discussion of the role played by nutrients in bloom promotion was conducted. Sara Steiner made note that nutrients likely do play a role, but are not the sole determination in bloom formation, as several of the lakes experiencing blooms are considered oligotrophic. Sara noted that it may be more important to know the bioavailability of phosphorous rather than total amount. Dave Neils mentioned that a loading analysis and subsequent nutrient tracking of a particular water body would allow for a determination of the internal loading of phosphorus (P) into the systems, a known contributor to cyanobacteria population growth. Nancy reiterated her contention that cyanobacteria population dynamics are more important for water systems to understand than contributing watershed factors.